

## Appendix M. Ranking comments from 44 respondents.

Table 1. Comments received about the 33 monitoring questions from the 44 respondents who ranked candidate vital signs.

National Framework level 1	Monitoring question	Comments
Air and Climate	Are climate associated ecotones changing through time?	If you are mapping changes in ecotones, it sounds as though your indicators are not anticipatory to major changes in the environment.
Air and Climate	Are climate associated ecotones changing through time?	For LAVO specifically
Air and Climate	Are climate associated ecotones changing through time?	May be difficult to address through management?
Air and Climate	Are climate associated ecotones changing through time?	Very long term
Air and Climate	Are climate associated ecotones changing through time?	Potentially important but difficult to interpret
Air and Climate	Are climate associated ecotones changing through time?	Big sign of ecosystem change, but climate change in general difficult to address at agency level, mainly good for public and policy makers information.
Air and Climate	How are snowpack dynamics changing over time?	Important to know but it doesn't seem like you could manage systems differently.
Air and Climate	How are snowpack dynamics changing over time?	Major ecosystem driver/hydro cycle
Air and Climate	How are snowpack dynamics changing over time?	Easy to monitor, hard to manage
Air and Climate	How are snowpack dynamics changing over time?	We cannot manage climate change.
Air and Climate	How is cave air flow (quantity and quality) changing through time?	This doesn't apply to all parks.
Air and Climate	How is cave air flow (quantity and quality) changing through time?	Can we manage air flow?
Air and Climate	How is cave air flow (quantity and quality) changing through time?	I don't know enough about caves.
Air and Climate	How is sea level and ocean temperature changing?	See ecotone comment.

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Air and Climate	How is sea level and ocean temperature changing?	Again can measure but I'm not quite sure what can be done with management.
Air and Climate	How is sea level and ocean temperature changing?	Doesn't apply to all parks.
Air and Climate	How is sea level and ocean temperature changing?	Info. on change could be gotten from secondary sources.
Air and Climate	What are status and trends in fog?	Doesn't apply to all parks.
Air and Climate	What are status and trends in fog?	Applies only to RNP
Air and Climate	What are status and trends in pollutants (e.g. ozone, N, S, particulates)?	Big sign of ecosystem change, but air pollution caused change in general difficult to address at agency level, mainly good for public and policy makers information.
Air and Climate	What are status and trends in pollutants (e.g. ozone, N, S, particulates)?	Mgmt signif. is high because LAVO is Class 1; however ecol. changes are minimal to date
Air and Climate	What are status and trends in pollutants (e.g. ozone, N, S, particulates)?	While it is important to monitor air pollutants and their affect on organisms, in order to determine how pollutants are changing species composition; it is the responsibility of our government and society to pass legislation controlling the emission of pol
Air and Climate	What are status and trends in pollutants (e.g. ozone, N, S, particulates)?	May be more amenable to management where sources are local?
Air and Climate	What are status and trends in visibility?	Management significance will depend on source?
Air and Climate	What are status and trends in visibility?	Doesn't seem relevant to KN
Air and Climate	What are status and trends in visibility?	Aesthetic problem, but in of itself not necessarily an ecologic stressor.
Air and Climate	What are status and trends in visibility?	Visibility from air pollution will be observed by monitoring based on Q#1.
Air and Climate	What is timing and duration of key climate-related phenological events?	Not sure about early warning criterion. By the time this has happened it would be difficult to manage impacts.
Air and Climate	What is timing and duration of key climate-related phenological events?	Too many potential variables
Air and Climate	What is timing and duration of key climate-related phenological events?	Big sign of ecosystem change, but air pollution caused change in general difficult to address at agency level, mainly good for public and policy makers information.
Biological Integrity	What are status and trends in focal species?	Ecological significance of keystone species is likely greater than that of many rare or sensitive species, particularly those that are extremely specialized or isolated.
Biological Integrity	What are status and trends in focal species?	Key to the work of Klamath Network
Biological Integrity	What are status and trends in focal species?	Keystone & sensitive spp. have higher ecol. sign.; rare spp. have higher mangmt. sign,

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Biological Integrity	What are status and trends in focal taxa groups?	not sure what is meant by "groups"
Biological Integrity	What are status and trends in focal taxa groups?	Monitor from the bottom of the food chain up. This will allow changes to be detected at the primary level.
Biological Integrity	What are status and trends in focal taxa groups?	Ultimately one has to decide whether they're monitoring these for the groups' own sake or as indicators. If it is the latter then it is critical to say what the organisms are supposed to be indicating as there isn't a single focal group that is a good i
Biological Integrity	What are status and trends in focal taxa groups?	"Focal" needs to be defined
Biological Integrity	What are status and trends in focal taxa groups?	
Biological Integrity	What are status and trends in structure, function, and composition of focal communities?	Plant communities create habitat
Biological Integrity	What are status and trends in structure, function, and composition of focal communities?	Really important ecologically but really time consuming to measure and tough to interpret, This question is too vague to be answered.
Biological Integrity	What are the long term trends in the predominant habitat types?	Would this fit better under Ecosystem Patterns and Processes?
Biological Integrity	What are the long term trends in the predominant habitat types?	Big management information need, but as an ecological stress indicator a bit vague for need to know.
Biological Integrity	What are the long term trends in the predominant habitat types?	Not anticipatory, but would be good to monitor. But, if this is being caused by climate change, maybe we should monitor the climate and use the changes in predominant types to back up these changes.
Biological Integrity	What are the long term trends in the predominant habitat types?	I feel a little overwhelmed by this questionnaire, but generally I believe that monitoring habitat trends/species composition, rather than focusing on species, should be of primary importance to the network.
Biological Integrity	What are the status and trends of biotoxin accumulation?	I don't know how much of a concern biotoxins are in this region.
Biological Integrity	What are the status and trends of biotoxin accumulation?	Importance varies with distance from source
Biological Integrity	What are the trends in diseases or parasites (including forest insects) through time?	Seems like some specific problematic disease could be surveyed, but a broad scale survey of parasites or pathogens doesn't seem like it would make sense.

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Biological Integrity	What are the trends in diseases or parasites (including forest insects) through time?	I don't think there is enough information on the natural range of variation for this to be a good indicator. Maybe?
Biological Integrity	What are the trends in diseases or parasites (including forest insects) through time?	Assume native organisms
Biological Integrity	What are the trends in diseases or parasites (including forest insects) through time?	My rating assumes NATIVE diseases or parasites.
Biological Integrity	What are the trends in distribution and abundance of non-native species through time?	Invasives are more important than non-native as a whole
Biological Integrity	What are the trends in distribution and abundance of non-native species through time?	Importance is increasing
Biological Integrity	What are the trends in pollinators?	Again, not enough baseline information on this to be a good vital sign.
Biological Integrity	What are the trends in pollinators?	Ecologically important; complex to manage
Biological Integrity	What are the trends in pollinators?	This topic may be redundant with the Question on Taxa Groups.
Ecosystem Pattern and Processes	How are connectivity, fragmentation, and level of park "insularity" changing with land use change in and around the parks?	I think that the type of data gathered to answer this question (satellite imagery, land use data) may be of great utility to future land managers.
Ecosystem Pattern and Processes	How are ocean and nearshore processes changing through time?	Doesn't apply to all parks.
Ecosystem Pattern and Processes	How are ocean and nearshore processes changing through time?	for REDW
Ecosystem Pattern and Processes	How are ocean and nearshore processes changing through time?	As with climate change, large scale oceanographic changes would have a big ecologic effect but there is little park management could do about it. Importance would be in informing public and policy makers.

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Ecosystem Pattern and Processes	How is woody debris production and storage changing over time?	
Ecosystem Pattern and Processes	How is woody debris production and storage changing over time?	At least 20 yr changes for PDO
Ecosystem Pattern and Processes	What are the status and trends in anthropogenic disturbance?	The VSs are very broad; I am assuming they are monitored locally
Ecosystem Pattern and Processes	What are the status and trends in anthropogenic disturbance?	Single most important management issue for park leaders – most control and ability to cause change.
Ecosystem Pattern and Processes	What are the status and trends in anthropogenic disturbance?	Effect of disturbance probably varies according to location, extent, duration, timing, etc.
Ecosystem Pattern and Processes	What are the status and trends in anthropogenic disturbance?	These questions are way too vague. There are so many types of anthropogenic disturbance. It seems this would be better monitored through land cover mapping.
Ecosystem Pattern and Processes	What are the status and trends in natural disturbance events (e.g. fire, floods)?	VSs are very broad
Ecosystem Pattern and Processes	What are the status and trends in natural disturbance events (e.g. fire, floods)?	Fire is the most important consideration
Ecosystem Pattern and Processes	What are the status and trends in natural disturbance events (e.g. fire, floods)?	Important from an ecological perspective, just gives park management a baseline upon which to measure anthropogenic caused change, little that management can/should do to effect natural events.
Ecosystem Pattern and Processes	What are the status and trends in natural disturbance events (e.g. fire, floods)?	It is really tough to separate natural and anthropogenic disturbances since they interact with one another.
Geology and Soils	Have rates, extent, location, or types of erosional and depositional processes changed?	This seems like a much more localized question than some of the other. I would imagine there would be some “problem” areas where these would be monitored.

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Geology and Soils	Have rates, extent, location, or types of erosional and depositional processes changed?	Is there baseline info to help us determine a natural range of variation?
Geology and Soils	What are changes in extent of soil crust?	Again may be an issue in a localized area, but not over a large area
Geology and Soils	What are status and trends in soils?	Interesting questions but really time consuming and expensive to monitor.
Geology and Soils	What are the status and trends in marine geologic processes?	Little management can do to about these processes except know they are happening and inform public. So little understood that would be a low priority for monitoring from an ecological perspective
Geology and Soils	What are the status and trends in marine geologic processes?	Doesn't apply to all.
Geology and Soils	What are the status and trends in marine geologic processes?	for REDW
Geology and Soils	What are the status and trends in marine geologic processes?	This seems really redundant with ocean and nearshore processes.
Geology and Soils	What are the status and trends in subterranean geologic processes?	I don't know enough of this.
Geology and Soils	What are the status and trends in subterranean geologic processes?	"Status and trends" seems overly vague and immeasurable unless you define the processes you're referring to.
Geology and Soils	What is the effusion rate of geothermal groundwater into the surface environment?	I don't know enough about this. I also don't think it applies to all parks.
Geology and Soils	What is the effusion rate of geothermal groundwater into the surface environment?	I have no idea how important this is.
Human use	What are status and trends in human impacts near sensitive plant and animal populations and habitats?	Ecological significance will likely vary.
Human use	What are status and trends in human impacts near sensitive plant and animal populations and habitats?	I assume monitoring will occur near sensitive populations
Human use	What are status and trends in human impacts near sensitive plant and animal populations and habitats?	It seems like there could be numerous types of human impacts for which the monitoring would be different. The list below is a mix of human impacts and ecological conditions. I'm not quite sure why they are included in the same subsection. Some of

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		them
Human use	What are status and trends in human impacts near sensitive plant and animal populations and habitats?	Again, single biggest ecological impact that can be affected by park management, most important things to monitor by far.
Human use	What are status and trends in human impacts near sensitive plant and animal populations and habitats?	More significant outside park boundaries.
Human use	What are the trends in harvesting of park resources?	Outside vs. inside may be an issue for management significance
Human use	What are the trends in harvesting of park resources?	Ecological significance will depend on resource
Human use	What are the trends in harvesting of park resources?	Monitoring harvesting is monitoring impact - not ecosystem health.
Human use	What are the trends in harvesting of park resources?	Same comment as above.
Water	What are status and trends in ground waters?	The large surface area of the Klamath network makes this important
Water	What are status and trends in pollutants (chemicals, nutrients, effluents, and trash)?	This is a lot of different issues lumped together. Question would need to be focused for the specific site where one of these was considered to be a problem.
Water	What are status and trends in subterranean water and ice?	Doesn't apply to all.
Water	What are status and trends in surface waters?	Too broadly stated